POCKET COMPUTER NEWSLETTER

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PANASONIC TO MARKET A HAND HELD COMPUTER

At a press conference held in New York City on November 10, 1981, Panasonic Company announced that it was ready to begin U.S. marketing of a hand held computer.

The unit is described by Panasonic as being approximately the size of a paperback book. Its actual measurements are 8-5/16 by 1-3/16 by 3-3/4 inches. Its weight is listed at 14 ounces.

The hand held computer sports a 65 key typewriter style keyboard featuring two-key rollover operation. The keys may be redefined using software. The single line display is made up of 159 columns of dots arranged as 8 rows which allows up to 26 characters to appear at one time. Special characters can be created with software.

Two versions of the hand held computer (HHC) have been announced. The RL-H1000 contains 2K of user memory. The RL-H1400 has 4K of memory that is programmable. In addition to the RAM elements, both units are capable of holding up to three ROM elements that can contain high level languages, operating systems and customized programs.

The new HHCs are claimed to be exceedingly powerful and the firm made it a point to state that the unit should not be confused with so-called *pocket computers* now available on the market. Panasonic representatives pointed out that their unit was capable of addressing hundreds of thousands — even megabytes — of memory. They also stated that a whole host of peripheral devices could be connected to the device, including in the near future, a floppy disk unit capable of running under the popular CP/M operating system.

Initially, however, the company stated that it would be providing six basic peripheral devices:

A video/rf adaptor capable of driving a color television display in a text mode of 16 lines by 32 characters or a graphics mode having 48 by 64 picture elements in eight colors.

A thermal printer that prints 15 characters per line.

An RS-232c serial interface through which one may connect various types of communications devices.

A programmable accoustic modem.

RAM expansion units allowing the addition of user memory in 4K or 8K blocks.

An I/O adaptor through which up to six other modules may be connected to the HHC.

All of the peripherals announced are small in size so that a complete system may be connected together while residing in a briefcase. Additionally, all of the units except the television interface operate off of the HHC's built-in battery supply. The TV interface utilizes an AC acaptor that powers the unit while recharging the HHC's batteries. The 44 pin bus system used to interconnect units has been specially designed so that units may be attached/detached without harming data in other units. Loose connections are signaled by an audio beeper.

Software modules announced for the system include a four-function calculator, an editor and a free-form file system. The unit also features an internal real-time clock with an accuracy of 1/256 of a second. Versions of BASIC and SNAP (a variation of FORTH) will also be available for the system.

The RL-H1000 unit having 2K of user memory has a list price of $500.00. The 4K RL-H1400 lists at $600.00. Peripheral units range from a list price of $158.00 for the I/O adaptor to $349.00 for the video/rf adaptor. A typical system price is likely to be in the range of $1500.00 to $2000.00.

For additional information contact: *Panasonic Company, One Panasonic Way, Secaucus, NJ 07094.*

Photo *The Panasonic Hand Held Computer*

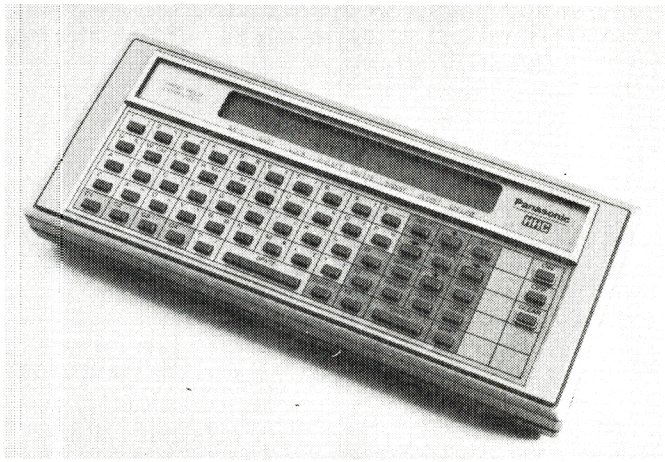
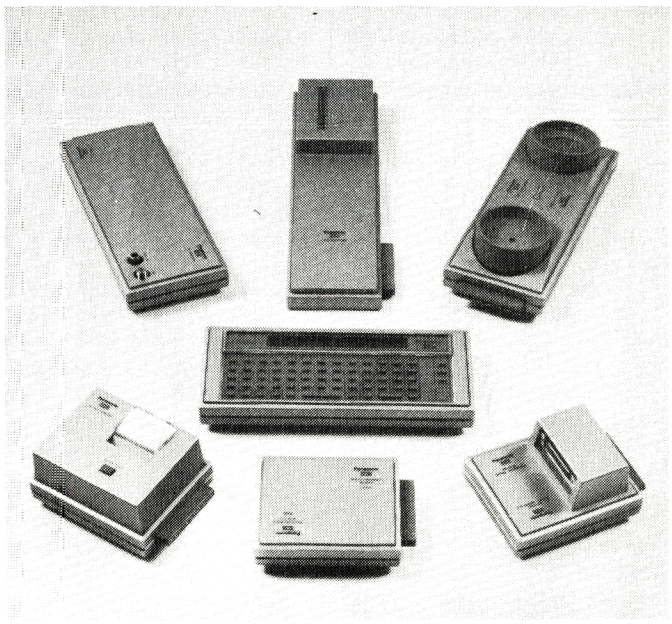


Photo *The Panasonic HHC Surrounded by Peripherals*



PRODUCT REVIEW
MATHEMATICS DRILL PACKAGE

Produced by: *Radio Shack for the TRS-80 Pocket Computer.*
List price: *$14.95*
Availability: *Radio Shack Computer Centers and selected Radio Shack stores.*
Reviewer: *C. C. Vans Evers II, 3607 Oklahoma, Tampa, FL 33611.*

Overview

The mathematics exercises contained in the three programs that make up the package *Mathematics Drill* are similar to those found in such single-purpose units as Texas Instruments' *Little Professor* and *Dataman.* That is, the user can specify the kind of operation (addition, subtraction, multiplication or division) and level of difficulty desired.

Although the Radio Shack programs provide more prompting, the execution speed of the PC software versus firmware is quite evident to those who have used a *Dataman* or similar unit. Inherent in the PC is a certain slowness that only careful programming can minimize.

The programming of the three programs (ED1, ED2 and ED3) is straightforward, using subroutine calls which account for quite a bit of the delay between inputs and displays. (As a matter of fact, the slow execution got boring to both my daughters, ages 7-1/2 and 12.)

One game is included. More on that later.

The programs use virtually all of memory. Three-digit line numbers predominate. Either initial use of, or conversion to, two-digit line numbers on final debug would have helped, as well as attempts to clean up some sections of code. For example, there is a GOTO in ED1 to a non-existent line number. Fortunately, the statement will never be executed in normal operation.

ED1

The first program is composed of three parts, each of which is subdivided so that addition, subtraction, multiplication or division and one of four levels of difficulty may be selected. (This is standard format throughout the package.) *Math Test* prompts the user to answer 10 items using the chosen operation. Three tries are allowed in which to input a correct answer, after which the program supplies the result.

Math Tables gives the user a choice of operators and a base number. The program then displays a number from 0 to 12, the selected operator, and the base value. In this mode, the correct answer is provided by the computer.

Tables Test is identical to *Math Tables* except that the user is expected to enter the correct answer.

One confusing point for adult users who are familiar with computers is that the ENTER key is not used after inputting answers. Instead the SHIFT = key is utilized. This didn't bother my children, but I was simply used to using ENTER.

This program, ED1, is no more and no less than what is available with single-purpose hand-helds, except that it is noticeably slower.

ED2

In its hurry to get software on the market, Radio Shack chose to substitute the well known *High-Low* game in place of the *Math Test* code of ED1. The remainder of ED2 is identical to ED1. For the most part, *High-Low* executes fairly quickly because the use of subroutine calls is limited.

The user has eight tries to guess a number between 0 and 100. If the (also!) well known strategy of what one might call a quasi-binary search is employed, the user can't lose. My 7-1/2 year old had to be told. My 12 year old figured it out fairly quickly. That's typical for those ages.

It is a shame that another numbers-oriented game wasn't paired with *High-Low* rather than what was done (or rather, *not done*, in this case). Perhaps *High-Low* could be used as a reward for doing all math problems correctly.

ED3

The third program in the package permits the user to specify two operands and an operator (+, -, * or /) for up to twelve problems. The problems are then displayed for the user to supply the proper answer.

Summary

With more compact and cleaner coding to eliminate what I would call bugs or inelegant techniques, the package would have greater execution speed and improved appeal.

For example, if division problems are chosen, the program prompts for the remainder. The remainder must then be entered, even if it is zero. Minor code modification could take care of that situation.

As is the case with most Radio Shack PC software available so far, the PC printer cannot be used with the package unless there is extensive program editing. Menus are displayed for each program. Since the menus are composed of PRINT statements, an endless loop occurs when the PC printer is activated.

If your children already have stand-alone math drill units, they already have what this package offers. However, if you are interested in studying the coding for this type of program or you really want a *High-Low* game, then consider this package.

PRODUCT REVIEW
BEGINNERS GUIDE TO PROGRAMMING

Author: *Bob McElwain*
Publisher: *XCEL, 13763 Polk Street, Sylmar, CA 91324*
List price: *$19.00*
Availability: *Directly from the publisher.*
Reviewer: *Nat Wadsworth, Editor.*

The full title of this educational package is the *Beginners Guide to Programming for the Sharp PC-1211 and Radio Shack TRS-80 PC.* The package is a book in combination with several packs of cards called "Program Cards" and "Task Cards." These are integrated to form a do-it-yourself course in programming.

The book contains 128 pages, is 8-1/2 by 11 inches and softcover. The text appears to have been set using a high quality typewriter at 1-1/2 line spacing. While this may not seem impressive, I actually found the format highly readable. The extra line spacing makes it easy to keep your place when working on problems.

This is definitely a "hands-on" book. The bulk of it is devoted to "lessons" that fill you in on specific aspects of developing programs. For instance, in Lesson 1 you learn about the PAUSE and PRINT directives. Lesson 2 takes you into "counting." Lesson 3 into "testing" and so forth. These lessons are designed to teach fundamental programming concepts while drilling a student on the practical aspects of implementing the concepts.

Thus, in the section on counting, concepts such as J=J+1 are integrated with the practical matters of assigning variables (in which to maintain the counts), the use of flowcharts, identifiers, the use of commas and semicolons in a PRINT statement, the importance of properly identifying results to the operator, the definition of an assignment statement, and so forth.

As each lesson is worked on, the student refers to separate "Program Cards" and performs the operations detailed. Each card presents and demonstrates one or two programming steps. The cards build upon one another in sequence.

For instance, the cards used in Lesson 1 start with a two-line program that displays a person's name. Other cards lead the user through the process of editing a program, correcting errors, inserting and deleting lines, and illustrate how a program can be made to "branch" to another section of itself.

The use of these cards definitely spices up the learning process.

A second group of cards for each lesson are referred to as "Task Cards." These cards can really be considered as mini-quizzes. They challenge the user to program the computer to perform a specific task or function. The reverse side of each card provides hints on how to approach the problem in case the student is stumped. The level of complexity of these cards relates directly to the progress made previously.

There are approximately 40 two-sided "Program Cards" and 20 "Task Cards" spread over seven lessons. These are in turn backed by about 40 pages of text in the book.

The next approximately 55 pages in the book build upon the basic concepts and principles developed earlier to work up three complete programs: the game HILO, a program called CAR that keeps track of travel expenses, and a rather substantial CHECKBOOK program. Each program is developed in a step-by-step expansion fashion. Fundamental capabilities are developed and then amplified by inserting additional routines.

The book is rounded out with a list of approximately 50 programming problems for those that want additional programming practice. While solutions to these problems are *not* provided in the book, they can be obtained from the publisher at a current charge of $4.00. (It appears as though the premise here is that the book may be used as a school text and that the solutions to these problems are supplied separately, if they are desired, as a teacher's reference.)

Finally, about 20 pages of the text book are devoted to illustrating solutions to the problems presented on the "Task Cards."

Conclusion

Many people have written *PCN* asking if anyone produced a good introductory text on programming using BASIC on a PC. This package may not be fancy in appearance, but its contents and methods are good in application. If you are a beginner to the art of programming a pocket computer, I would recommend this package. School teachers might be wise to examine this package as a possible text or teaching supplement, too. It takes patience for an expert to develop and write this type of course. I hope students of this package will recognize the talent of its author.

PRODUCT REVIEW
101 POCKET COMPUTER PROGRAMMING TIPS & TRICKS

Author: *Jim Cole*
Publisher: *ARCsoft Publishers, P.O. Box 132, Woodsboro, MD 21798*
List Price: *$7.95*
Availability: *Directly from the publisher.*
Reviewer: *Nat Wadsworth, Editor.*

An advertising blurb on the back of this publication, after listing a number of the routines contained therein, states that ". . . . dozens more are in this handy sourcebook of notes and ideas from a programming pro, for the newcomer, novice programmer, layman and general consumer user." This certainly appears to be a truthful statement. This book is not intended for expert programmers. It is, however, full of tips and ideas for beginning programmers.

Some tips appear rather trivial. For instance, almost a page of text is devoted to touting the excitement of a flashing "billboard" which leads to the presentation of the one line statement:

```
100 FOR L=1 TO 3:PAUSE " *RED ALERT *":NEXT L
```

Few *PCN* readers are likely to find this a new or startling "tip." It is granted, however, that a novice programmer who had missed the joy of discovering such operation on his/her own, would certainly be able to pick up on the idea after the build up it receives in this manual!

Other examples are introduced with less build up and are, indeed, less trivial. Jim Cole illustrates how to program a look-up table, methods of generating pseudorandom numbers, isolating the decimal portion of a number, various ways to round off numbers, error trapping, jumping to labels, ways of exiting loops, and other operations. These examples present important concepts in the context of practical applications and are of particular value to beginning programmers.

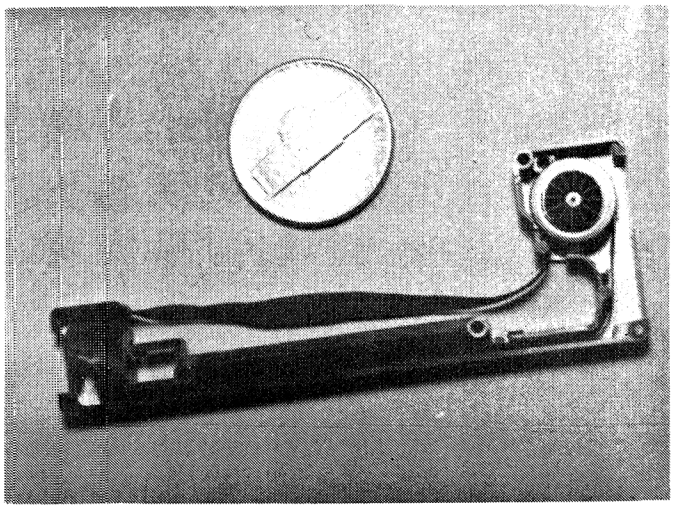
No, this is not a book for programming experts who think they may have missed little goodies in their PC's operating manuals or those who are seeking esoteric capabilities. It is a book for programming novices – and possibly intermediates – who need to explore PC programming ideas and concepts. At a price of less than eight cents an idea, this publication is certainly worthy of consideration.

Read any good books on the use of pocket computers? Be sure to tell us about them so that we can spread the word. Thanks!

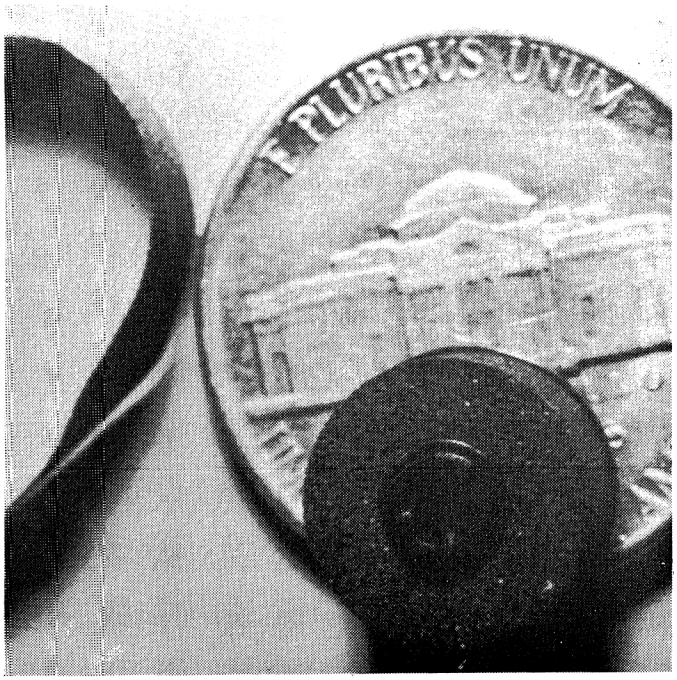
INSIDE THE SHARP CE-122 PRINTER RIBBON CARTRIDGE

The printer for the Radio Shack and Sharp pocket computers uses a miniscule ribbon cartridge employing a continuous loop of ribbon.

A close look at the underside of the cartridge shows the trademark *Epson*. This is undoubtably the same company that manufactures the well respected MX series printers for desktop computers.



The inside of the cartridge contains an endless loop of ribbon that is continually re-inked by a foamy pivot. This pivot may be seen in the upper right portion of the cartridge as shown in the accompanying photograph. This picture shows the cartridge with its bottom cover removed.



When contrasted with an ordinary nickel, the foamy pivot is observed to be quite small.

At around $3.00 for a ribbon cartridge, many people have been opting to re-ink the ribbon directly or by placing a drop of ink on the foam element. The manufacturer does not recommend this because the ribbon will eventually fray. A frayed ribbon may eventually snag the printing pins and cause severe damage to the printer.

Perhaps someone will put together a package with a small vial of ink and a supply of ribbon loops at an inexpensive price?

This photo-story by: *Ken Slaughter, 2916 Bangor Avenue, Highland, CA 92346.*

NUMERICAL INTEGRATION ROUTINES

The routines presented here were provided by *Norlin Rober, 407 North 1st Avenue, Marshalltown, IA 50158.* They may be used to approximate the integral from a to b of f(x) dx. Each program calls upon a subroutine that is assumed to start at line 90. This subroutine, provided by the user, must compute Y as a value of X. The variables A, B, N, S, W and Z should not be altered by the user when interfacing with the routines.

(1) Trapezoidal Rule

```
10 INPUT "A?";A,"B?";B
11 INPUT "N?";N
12 X=A:GOSUB 90:S=.5Y:X=B:GOSUB 90:S=S+.5Y:FOR Z=1 TO
   N-1
13 X=A+(B-A)Z/N:GOSUB 90:S=S+Y:NEXT Z:S=(B-A)S/N:BEEP 1
   :PRINT S:END
```

(2) Simpson's Rule

```
20 INPUT "A?";A,"B?";B
21 INPUT "N?";N
22 X=A:GOSUB 90:S=Y:X=B:GOSUB 90:S=S+Y:W=2:FOR Z=1 TO
   N-1
23 X=A+(B-A)Z/N:GOSUB 90:W=6-W:S=S+WY:NEXT Z
24 S=(B-A)S/3N:BEEP 1:PRINT S:END
```

(3) Three-eighths Rule

```
30 INPUT "A?";A,"B?";B
31 INPUT "N?";N
32 X=A:GOSUB 90:S=Y:X=B:GOSUB 90:S=S+Y:Z=N-1
33 GOSUB 35:S=S+3Y:GOSUB 35:S=S+3Y:IF Z GOSUB 35:S=S+2Y
   :GOTO 33
34 S=3S/8N*(B-A:BEEP 1:PRINT S:END
35 X=A+(B-A)Z/N:Z=Z-1:GOTO 90
```

(4) Bode's Rule

```
40 INPUT "A?";A,"B?";B
41 INPUT "N?";N
42 X=A:GOSUB 90:S=7Y:X=B:GOSUB 90:S=S+7Y:Z=N-1
43 GOSUB 45:S=S+32Y:GOSUB 45:S=S+12Y:GOSUB 45:S=S+32Y
   :IF Z GOSUB 45:S=S+14Y:GOTO 43
44 S=(B-A)S/22.5N:BEEP 1:PRINT S:END
45 X=A+(B-A)Z/N:Z=Z-1:GOTO 90
```

(5) Weddle's Rule

```
50 INPUT "A?";A,"B?";B
51 INPUT "N?";N
52 X=A:GOSUB 90:S=Y:X=B:GOSUB 90:S=S+Y:Z=N-1
53 GOSUB 56:S=S+5Y:GOSUB 56:S=S+Y:GOSUB 56:S=S+6Y
   GOSUB 56:S=S+Y:GOSUB 56:S=S+5Y
54 IF Z GOSUB 56:S=S+2Y:GOTO 53
55 S=.3S/N*(B-A:BEEP 1:PRINT S:END
56 X=A+(B-A)Z/N:Z=Z-1:GOTO 90
```

(6) Midpoint Rule

```
60 INPUT "A?";A,"B?";B
61 INPUT "N?";N
62 S=0:FOR Z=1 TO N
63 X=A+(B-A)/N*(Z-.5:GOSUB 90:S=S+Y:NEXT Z:S=(B-A)S/N
   :BEEP 1:PRINT S:END
```

Choosing Subintervals

The number of subintervals used, N, must be chosen as follows:

Trapezoidal Rule: Any integer, 2 or greater.
Simpson's Rule: Any even integer, 2 or greater.
Three-eighths Rule: Any positive integral multiple of 3.
Bode's Rule: Any positive integral multiple of 4.
Weddle's Rule: Any positive integral multiple of 6.
Midpoint Rule: Any positive integer.

Example Solutions

As an illustration, consider the approximation of the integral over the interval 0 to 1 of $(1/1+X^2)dx$. Analytical methods show that the exact value of the integral is pi/4.

In performing the tests, line 90 contained the subroutine:

```
90 Y=1/(1+XX:RETURN
```

The values of A and B for the desired interval are 0 and 1 respectively. If the value of N is selected as 12, the various approximation routines yield the following results:

Trapezoidal Rule:	.7851088118
Simpson's Rule:	.7853981600
Three-eighths Rule:	.7853981484
Bode's Rule:	.7853981744
Weddle's Rule:	.7853981693
Midpoint Rule:	.7855428391
Pi/4 actually equals:	.7853981634

Bonus Routine: Gaussian Quadrature

The following routine may be used to approximate an integral using a 16-point Gaussian quadrature. An advantage of this method over those previously described is that the function need not be defined at the end points of the interval. As in the previous routines, a subroutine beginning at line 90 should calculate Y as a function of X.

```
80 INPUT "A?";A,"B?";B
81 S=0:W=.09501250984:Z=.1894506105:GOSUB 86:W=.281603
   5508:Z=.182603415:GOSUB 86
82 W=.4580167777:Z=.1691565194:GOSUB 86:W=.6178762444
   :Z=.1495959888:GOSUB 86
83 W=.7554044084:Z=.1246289713:GOSUB 86:W=.8656312024
   :Z=.09515851168:GOSUB 86
84 W=.9445750231:Z=.06225352394:GOSUB 86:W=.989400935
   :Z=.02715245941:GOSUB 86
85 S=.5S*(B-A:BEEP 1:PRINT S:END
86 X=.5*((B-A)W+A+B:GOSUB 90:X=.5*((A-B)W+A+B:W=Y
   :GOSUB 90:S=S+Z*(W+Y:RETURN
```

The example used earlier yields .7853981635 by this method.

PROBABILITY FUNCTIONS TO 10 PLACES

Norlin Rober presents the following routines that calculate the probability that a random variable having the stated probability distribution will exceed a given value. The routines calculate ten digits following the decimal point, with the tenth digit being considered unreliable. Parameter values are assumed to be stored in the appropriate variable locations when the routines are entered.

Normal Distribution

Given Z, the probability P of exceeding Z is calculated. Any value of Z may be used. Execution time varies to a maximum of 30 seconds.

```
10 Y=ZZ:IF Y>41 LET P=SGN Z/2:GOTO 13
11 P=1:FOR X=9+2*INT 8Z to 3 STEP -2
12 P=PY/X+1:NEXT X:P=PZ/√(2 π *EXP Y
13 P=.5-P
```

The routine uses 82 steps and variables P, X, Y and Z.

Student's T-Distribution

Given T and N, the number of degrees of freedom, the probability of exceeding T is calculated. Any value of T may be used. Execution time depends on N. It is approximately N/3 seconds. The computer must be in the DEGree mode.

```
20 P=(N>1:X=N/(N+TT:Y=P
21 IF N>2 FOR Y=N-3 TO 2 STEP -2:P=1+PXY/(Y+1:NEXT Y
22 IF Y=1 LET P=.5PT/√(N+TT:GOTO 24
23 P=PTX/√N/π + ATN(T/√N)/180
24 P=.5-P
```

The routines takes up 116 steps and uses variables N, P, T, X, Y and Z.

Chi-Square Distribution

Given C (Chi-squared) and N (the number of degrees of freedom), the probability P of exceeding C is calculated. The maximum usable value of N (to prevent overflow) is 120. Execution time varies considerably. It becomes long if N is large or if C is large compared to N.

```
30 P=0:X=N:Y=1:IF C=0 GOTO 34
31 Z=P:P=P+Y:X=X+2:Y=CY/X:IF P>Z GOTO 31
32 Y=1:FOR X=N TO 2 STEP -2
33 Y=XY:NEXT X:P=P/Y*EXP(.5N*LN C-.5C: IF X=1 LET P=P/
   √.5π
34 P=1-P
```

The routine requires 122 steps and uses variables C, N, P, X, Y and Z.

Notes

The routines illustrated may be incorporated into programs involving statistical analysis in which the level of significance is sought. The need for tables is thus eliminated while achieving increases in accuracy and versatility.

Test Examples

Normal probability: Z=2: Calculated value of P=.022750132
Student's T: N=1: T=2: Calculated value of P=.1475836176
N=4: T=5: Calculated value of P=.0037452171
Chi-square: N=1: C=4: Calculated value of P=.0455002649
N=2: C=5: Calculated value of P=.0820849981
N=25: C=42: Calculated value of P=.017972808

PROGRAM KEEPS TRACK OF BANK & CREDIT CARD BALANCES

Arthur C. LeFort, Jr., 174 Colburn Street, Dedham, MA 02026, provides this program for Radio Shack and Sharp PCs. Now you won't have any excuse for overdrawing your account or exceeding your credit limit! By the way, Art specifically designed this program so that you can use a printer if you need to have a permanent record of your account balances.

Program *Account Balances*

```
50:"Z":PRINT "A
   CCT BAL"
52:INPUT "DATE/
   TIME(YYMMDDT
   TT)";T
53:PRINT "D/T="
   ;T
55:PRINT "MENU:
   1=CHK,2=MC,3
   =AX"
56:PRINT "4=SRS
   ,5=LCH,6=FIL
   ,7=ZAY"
57:PRINT "8=VSA
   ,9=CAL,10=CB
   ,11=DC"
65:INPUT "MENU#
   =";Z
66:PRINT "MENU#
   = ";Z
69:IF Z=0THEN 0
   50
70:IF Z=1THEN 1
   10
72:IF Z=2THEN 1
   20
74:IF Z=3THEN 1
   30
76:IF Z=4THEN 1
   40
78:IF Z=5THEN 1
   50
80:IF Z=6THEN 1
   60
82:IF Z=7THEN 1
   70
84:IF Z=8THEN 1
   80
86:IF Z=9THEN 1
   90
88:IF Z=10THEN
   200
90:IF Z=11THEN
   210
110:PRINT "CHK B
   AL=";C
111:X=0
112:INPUT "DEP(+
   )OR CHK(-)="
   ;X
114:C=C+X
116:PRINT "NEW C
   HK BAL=";C:
   GOTO 065
120:PRINT "MC CR
   ED.LINE=";V
121:V=500.00
122:X=0
124:GOSUB 300
125:B=B+X
126:PRINT "OUTST
   . BAL=";B
127:M=V+B
128:PRINT "RSV="
   ;M:GOTO 065
130:PRINT "AX CA
   RD"
131:X=0
132:GOSUB 300
134:N=N+X
136:PRINT "OUTST
   . BAL=";N:
   GOTO 065
140:PRINT "SEARS
   CRED LINE="
   ;L
141:L=500.00
142:X=0
144:GOSUB 300
145:K=K+X
146:PRINT "OUTST
   .BAL=";K
147:J=L+K
148:PRINT "RSV.=
   ";J:GOTO 065
150:PRINT "LECH.
   CRED.LINE=";
   H
151:H=300.00
152:X=0
154:GOSUB 300
155:G=G+X
156:PRINT "OUTST
   .BAL=";G
157:F=H+G
158:PRINT "RSV="
   ;F:GOTO 065
160:PRINT "FIL C
   ARD"
161:X=0
162:GOSUB 300
164:D=D+X
166:PRINT "OUTST
   .BAL=";D:
   GOTO 065
170:PRINT "ZAY C
   DT LINE=";S
171:S=300.00
174:GOSUB 300
175:A=A+X
176:PRINT "OUTST
   .BAL=";A
177:P=A+S
178:PRINT "RSV="
   ;P:GOTO 065
180:GOSUB 310
190:PRINT "CLDR"
191:X=0
192:GOSUB 300
194:U=U+X
196:PRINT "OUTST
   BAL=";U:
   GOTO 065
200:GOSUB 310
210:GOSUB 310
299:END
300:INPUT "PMT(+
   )OR CHG(-)="
   ;X
302:PRINT "PMT(+
   )OR CHG(-)="
   ;X
304:RETURN
310:PRINT "NO CA
   RD YET":GOTO
   065
312:RETURN
```

UNLIMITED NESTING OF SUBROUTINES

Several readers have noted the fact that variables may be used in the Radio Shack/Sharp PCs to facilitate nesting of subroutines to more than the four levels permitted by the unit's internal subroutine stack. The procedure to use is simply assign the value of the next line number to be executed after returning from a subroutine call to a variable name. Use a GOTO directive to jump to the start of the desired subroutine. Use the directive GOTO VARIABLE to terminate the subroutine instead of the usual RETURN statement. An example:

```
100 Z=110:GOTO 900
110 .... main program continues from here ....
.....
900 .... subroutine starts here ....
.....
990 GOTO Z
```

Directed GOTOs Also Possible

Along these same lines of using a variable as a label, you can create directed GOTO statements. Say, for instance, that a variable can only take on integer values from 1 to 5. A different operation is to be performed for each value that the variable assumes. The following arrangement permits five different routines to be established starting at lines 100, 200, . . . etc., and gives the program capability to branch immediately to the proper segment:

```
 10 .... main program begins ....
 50 .... variable Z set to value 1 to 5 by user input here ....
 60 Z=Z*100:GOTO Z
.....
100 .... routine executed when Z = 1 ....
200 .... routine executed when Z = 2 ....      etc.
```

TIME ADDITION

Submitted by: *David G. Motto, 3639 Roosevelt Circle, Jackson, MI 49203.*

This routine was developed for a Radio Shack TRS-80 PC and may be used with or without the printer unit. The routine accepts inputs in the form of MM.SS, where MM stands for minutes and SS for seconds. Use the ENTER key after each timing input. To obtain a tally of all times, press the ENTER key again.

Program *Time Addition*

```
100 B=0
110 A=0:INPUT "TIME? ";A
120 IF A=0 GOTO 150
130 B=B+DEG A
140 GOTO 110
150 B=1000*DMS B
160 C=B/100:IF (C-INT C)>.3
    LET C=C+1
170 B=INT C/100
180 PRINT "TOTAL: ";B:GOTO 100
```

BLACKJACK

As submitted by: *Brian Peterson, 6807 N. Sheridan Rd., Apt. 520, Chicago, IL 60626.*

```
1:INPUT "SEED=
  ";S:X=E2:W=0
  :R=-1
2:BEEP 2:IF -R
  PAUSE "SHUFF
  LING...":FOR
  R=27TO 39:A(
  R)=5:NEXT R:
  IF W=0GOTO 2
  5
3:PRINT "YOU:"
  ;A$;B$;C$;D$
  ;E$;F$;"DEAL
  ER:";G$;H$;I
  $;J$;K$;L$;M
  $:RETURN
4:W=ABS (43914
  7+W+S:W=23W-
  E8*INT (23W/
  E8:N=26+INT
  (13W/E8+1:A(
  N)=A(N)-1:IF
  A(N)LET R=R-
  1:GOTO N-21
5:GOTO 4
6:A$(P)="A":V=
  1:0=10:
  RETURN
7:A$(P)="2":V=
  2:RETURN
8:A$(P)="3":V=
  3:RETURN
9:A$(P)="4":V=
  4:RETURN
10:A$(P)="5":V=
  5:RETURN
11:A$(P)="6":V=
  6:RETURN
12:A$(P)="7":V=
  7:RETURN
13:A$(P)="8":V=
  8:RETURN
14:A$(P)="9":V=
  9:RETURN
15:A$(P)="T":V=
  10:RETURN
16:A$(P)="J":V=
  10:RETURN
17:A$(P)="Q":V=
  10:RETURN
18:A$(P)="K":V=
  10:RETURN
19:INPUT "INSUR
  ANCE?";N$:IF
  N$="N"RETURN
20:N=INT .5Y:X=
  X-N:PAUSE "Y
  OU LOSE $";N
  :IF U+0K>21
  LET V=0:
  GOSUB 31:
  RETURN
21:GOSUB 2:U=0:
  RETURN
25:FOR Y=1TO 13
  :A$(Y)=" ":
  NEXT Y:0=0:T
  =0:U=0
26:BEEP 1:PAUSE
  "BANK $";X:
  IF XINPUT "B
  ET=";Y:IF Y-
  XGOTO 26
27:IF X<=0INPUT
  "AGAIN?";N$:
  IF N$="Y"LET
  X=E2:GOTO 26
28:IF X<=0END
30:PAUSE "DEALI
  NG...":P=7:
  GOSUB 4:U=U+
  V:P=8:GOSUB
  4:Z=V:U=U+V:
  P=1:GOSUB 4:
  T=T+V:P=2:
  GOSUB 4:T=T+
  V:P=3
31:N$=G$:G$="^"
  :GOSUB 2:G$=
  N$:IF V=0
  RETURN
35:IF P=3IF 0=1
  0IF T=11
  PAUSE "BLACK
  JACK!":Y=1.5
  Y:GOTO 63
40:IF P=3IF (Z=
  1)+(Z=10
  GOSUB 19:IF
  U=0GOTO 25
42:IF P=3IF 0=0
  IF (T=10)+(T
  =11INPUT "DO
  UBLE?";N$:IF
  N$="Y"GOSUB
  4:Y=2Y:T=T+V
  :GOTO 50
45:IF P<7IF T<=
  21INPUT "HIT
  ?";N$:IF N$=
  "Y"GOSUB 4:T
  =T+V:P=P+1:
  GOTO 31
48:IF T>21PAUSE
  "YOU BUST WI
  TH ";T:GOTO
  65
50:GOSUB 2:0=0:
  P=3:IF G$="A
  "LET 0=10
51:IF H$="A"LET
  0=10
53:N=U+0:IF (U
  <>6)+(0K<10
  IF N<=21IF N
  >=17+(P>8LET
  U=N:GOTO 60
54:IF U>21PAUSE
  "DEALER BUST
  S WITH ";U:
  GOTO 63
55:IF U>=17+(P>
  8GOTO 60
57:P=P+1:GOSUB
  4:U=U+V:IF V
  =1LET 0=10
59:GOSUB 2:GOTO
  54
60:PAUSE "DEALE
  R STAYS WITH
  ";U:FOR N=1
  TO 6:IF A$(N
  )="A"LET 0=1
  0:N=6
61:NEXT N:IF U
  >=T+0*((T+0)
  <=21GOTO 65
63:PAUSE "YOU W
  IN $";Y:X=X+
  Y:IF X<E4
  GOTO 25
64:PRINT "YOU W
  ON $";X:END
65:PAUSE "YOU L
  OSE $";Y:X=X
  -Y:GOTO 25
```

YES, THERE IS A DIFFERENCE

Dan Pinko, of Parksville, B.C., Canada, reports that there is a difference between the Sharp PC-1211 and the Radio Shack TRS-80 PC. Namely, the PC-1211 (or at least the one he has!) does not execute the special CLOAD 1 directive. This command, explained on page 96 of the manual for the TRS-80 PC, allows a user to load multiple programs into the PC. It is used to bring in a program from a cassette tape without wiping out the current contents of memory. (All of memory is effectively erased if an ordinary CLOAD directive is used to load a program from tape.)

CORRECTION TO SUPER-WUMPUS

Joseph P. Jones from Danville, IL, makes the following recommendations concerning the program listed on page 3 of Issue 08 of *PCN*: First, either line 5 should use the statement H=INT (G*.12)+1 or line 200 should contain T=23 + INT (H/6). This is needed to prevent M from exceeding 26 in line 200. Second, line 105 should use IF K=1 to prevent bats from taking you twice. Finally, in line 95 there should be a colon (:) before the statement GOTO 40.

Thanks for the improvements, Joseph.

FROM THE WATCH POCKET

Here it is, the end of our first year of publication. Time to recap and look ahead.

1981 was the first full year of the existence of pocket computers after their introduction in the latter part of 1980. In retrospect, relatively little (in comparison with what is likely to happen in 1982!) happened to advance the state of the art. True, users were provided with the ability to get a printed listing of results and programs. And, just a few months ago a second company (Casio) began offering competition to the original Sharp/Radio Shack PC. However, though it does offer some increased operating speed, the Casio certainly does not represent a significant advancement in terms of PC capability. The newly announced Panasonic HHC, which the firm does not want misconstrued as a pocket computer (and about which I will have more to say shortly), really is not yet available in the U.S. A serious shortcoming of PCs, in my opinion, has yet to be overcome. This is plain and simply the relatively long length of time and general awkwardness involved in loading a new program into the machine. It is certainly a problem that could readily be overcome with today's technology if somebody in the marketing department ever tuned into the fact that it is a serious handicap. No, 1981, was not a year of great advancement. It might perhaps best be characterized as the initial year of assimilation by the advanced echelons of our technological society. I have seen few layman caught by any desire to own or utilize a PC.

The Year Ahead

1982 will undoubtably be a year of increasing momentum in the field. While there was only one new firm actually entering the field and delivering product in 1981, there are likely to be 10 to 20 firms coming on line in 1982. Some of these will be biggies. I expect Texas Instruments to pop something in this area, though I doubt that it will be anything earth shaking. Hewlett-Packard is also expected to join the fray and I have high hopes that they can at least advance the field in terms of general capability and the program loading area. Some large Japanese firms will have additional entries.

Of course, Sharp Electronics, the originator of the PC as we know it, will continue to be a contender. Having a great, almost two year jump on the competition, and that extended length of time in which to conduct market research and determine user's desires, I expect that they will come up with another winner in 1982. It is likely that they will arrive with increased memory capacity, improved mass storage (hopefully fast loading and convenient to use). I believe they will quite likely incorporate the feature most sought after by many PC users – the ability to connect (perform input/output operations) with other devices.

The general consensus appears to be that something over a quarter of a million PCs were sold in 1981. 1982 could see this figure easily approach 2 million units amongst the various vendors. At an average retail price of $200.00 we are talking about a market approaching four hundred million dollars. Nothing to sneeze about.

While the average price of new units, because they offer improved capability, is likely to stay around $200.00, there will be steady price reductions just as there were in 1981. For instance, the introductory $249.95 price of the Sharp PC-1211 is now down to $179.95. Radio Shack offers a holiday sale price on their original $249.95 unit of just $169.95. A unit having the capability of a PC-1211 will likely be under $100.00 by this time next year, possibly reaching as low as the $80 mark.

The Panasonic HHC

After approximately a year of dropping repeated hints as to its capabilities, Panasonic and Friends Amis (the designers) unveiled their Hand Held Computer. There are still a lot of unanswered questions about the unit, including when will it actually be available in the U.S. At this point it appears that for $500.00 you get a 2K portable computer that can also act as a terminal. For another $100.00 you can get an added 2K of memory. That is quite a bit less than the 16K worth that Clive Sinclair delivers as an add on to his ZX81 for the same price! In all fairness, it is still too early to talk in real specifics about this device because we cannot get our hands on an actual unit. It appears that it may be several months before they are generally available in this country, though the firm claims they have already begun supplying the units in Europe.

This and That

There is an outfit, **Conlen's Custom Cases**, *Box 306, Norristown, PA 19404*, that provides custom-built briefcases for Radio Shack and Sharp PCs. The price is $72.50 plus shipping/handling. You can phone (215) 279-5334 for more information.

If you are into using your PC for gambling activities, write to **Joe Computer**, *22713 Ventura Blvd, Suite F, Woodland Hills, CA 91364*, for a copy of their catalog.

Bob McElwain is putting out a newsletter for PC users entitled **Compunotes**. A sample issue is $4.00. For information write to **XCEL**, *13763 Polk Street, Sylmar, CA 91342.*

There hasn't been much in the computer trade magazines lately for PC users. Look for this to change in 1982 as more powerful PCs force magazine editors to pay attention to this area.

If you wish additional information on the Sinclair ZX81 announced in Issue 09 of *PCN*, please write directly to the U.S. supplier, **Sinclair Research Ltd.**, *One Sinclair Plaza, Nashua, NH 03061.*

An outfit by the name of **H L Enterprises**, *22 Ellsworth Avenue, Morristown, NJ 07960*, puts out a clever little gadget called the *Line-Minder* (TM) that may be of interest to *PCN* readers. It consists of a clamp strip that will hold onto the side of a single sheet of paper. A line guide travels along this clamp strip making it easy to keep your place when, for instance, you are loading a program. It works on either side of a sheet of paper and is thus ideal for *PCN* readers who frequently lose their place while trying to load in a program from a listing. The price of the clever little device is $2.95. The phone number of H L Enterprises is (201) 539-8058 if you need more information.

Technical manuals on the Radio Shack TRS-80 Pocket Computer and the companion printer/cassette interface are reportedly available now through special order. Tell your local dealer what you are looking for and ask him/her to order it for you. Expect to wait a few weeks for delivery. Several readers have indicated it is well worth the price and the wait if you are interested in the electronic details (schematics, etc.) of your unit.

My personal thanks to all of you who participated in the recent survey of pocket computer users. Your answers will influence the future design of pocket computers.

If you are a serious user of personal computers and feel it is important to have access to a large historical reference on the field, be sure to obtain a copy of the December, 1981, issue of **BYTE Magazine.** This edition features a comprehensive, multiple-key index to all articles published in the magazine since its inception.

If you are thinking of submitting material to *PCN*, please be advised that readers are expressing particular interest in job-related applications of their pocket computers. Please, do not submit versions of popular games. We have quite a sufficient backlog of entertainment programs to last for some time. The chances of a game submission being accepted at this time are virtually nil. Good, practical applications programs will receive careful consideration. Please remember to include a cassette copy of the program being submitted if it is more than a few lines in length. Allow 4 to 8 weeks for an article or program to be reviewed. Include a stamped, self-addressed mailer if you want submitted materials that are not accepted for publication returned.

A New Mailer

Beginning with the next issue, *PCN* will go to a lighter weight paper and use a new mailer. The primary purpose of this change is to reduce the cost of postage so that we may continue to serve you by first class mail despite the fact that the USPS has raised the rate of first class mail by 33 percent during the past year.

PCN plans to continue bringing you the latest information about pocket computers, to provide timely and informative reviews and practical, useful programs. We plan to continue doing this in a speedy, compact manner so that you may quickly glean information that is of value to you and get on to the business of your day.

Thank you for your support. Best wishes in the coming New Year!

1981 INDEX TO ARTICLES AND PROGRAMS

BUSINESS PROGRAMS

Forbes, Jack
Trip Expenses ..... 06 - 6

McCroskery, Allan
Estimating and Billing Program ..... 04 - 3

Motto, David
Payroll Tax Deductions (Revised) ..... 05 - 2
Year Day ..... 07 - 3
Pocket Notebook (Casio FX-702P) ..... 09 - 4

Peterson, Brian
Banner Program ..... 07 - 6

Slaughter, Ken
Printer Program Calculates Simple Interest ..... 07 - 5

Staff, PCN
Memo Pad Program ..... 01 - 1
Payroll Tax Deductions Program ..... 03 - 1

ENTERTAINMENT PROGRAMS

Heidbrink, Gary
Jackpot Slots ..... 05 - 2
Vegas Craps ..... 06 - 4
Rock, Paper, Shears ..... 07 - 6
Super-Wumpus ..... 08 - 2
Hangman ..... 09 - 7

Motto, David
Word Squares ..... 06 - 2
Word Squares (Casio FX-702P) ..... 09 - 4
Reflex (Casio FX-702P) ..... 09 - 4

Peterson, Brian
Blackjack ..... 10 - 6

Rober, Norlin
Tic-Tac-Toe ..... 05 - 5

GENERAL APPLICATIONS

Leahy, Robert J.
Programming Form ..... 05 - 4

Motto, David
Time Addition ..... 10 - 6

Rober, Norlin
An Assortment of Sorts ..... 08 - 6

Staff, PCN
Alarm Clock Program ..... 02 - 3

Vans Evers II, C. C.
Numeric Sort ..... 05 - 5

OPERATING INFORMATION

Korda, Peter
Having Program Loading Problems? ..... 09 - 8

Librach, Hank
Remaining Printer Tape Program ..... 08 - 5

McCroskery, Allan
Cheaper Printer Paper ..... 07 - 5

Motto, David
String Printer Routine ..... 08 - 5

Rober, Norlin
Programming Tips ..... 04 - 1
Memory Surprise ..... 04 - 2
Radio Shack Pocket Computer Tokens ..... 05 - 3
Program Memory Addresses ..... 06 - 4
String Variables Storage ..... 07 - 4

Slaughter, Ken
More Interfacing Information ..... 06 - 3
Inside the Sharp CE-122 Printer Ribbon Cartridge ..... 10 - 3

Staff, PCN
Radio Shack Pocket Computer Interfacing Signals ..... 04 - 1
Timing Comparisons ..... 04 - 2
Unlimited Nesting of Subroutines ..... 10 - 5

Vans Evers II, C. C.
Operating Tips ..... 05 - 1

PRODUCT ANNOUNCEMENTS

Staff, PCN
The Sharp Printer/Cassette Interface ..... 06 - 1
Interface Your PC to a Bigger Computer ..... 06 - 6
Casio Announces a Hand Held Computer ..... 07 - 1
The Shape of the Future ..... 08 - 1
First Computer For Less Than $100.00 ..... 09 - 1
Panasonic Announces HHC ..... 10 - 1

PRODUCT REVIEWS

McCroskery, Allan
Business Statistics/Marketing Package ..... 06 - 3

Motto, David
The Casio FX-702P Hand Held Computer ..... 09 - 2

Slaughter, Ken
The Sharp CE-122 Printer ..... 07 - 2

Staff, PCN
Business Finance Program Package ..... 02 - 1
Games Pack 1 ..... 03 - 2

Vans Evers II, C. C.
Mathematics Drill Package ..... 10 - 2

Wadsworth, Nat
Travel/Business Expenses Program ..... 09 - 5
Beginners Guide to Programming ..... 10 - 2
101 Pocket Computer Programming Tips and Tricks ..... 10 - 3

SCIENTIFIC & ENGINEERING PROGRAMS

Motto, David
Hexadecimal/Decimal Program ..... 05 - 1

Rober, Norlin
Solving Linear Equations ..... 04 - 2
Prime Factors of Positive Integers ..... 05 - 6
Plotter Program ..... 08 - 4
Multiple-Strip Plotter Program ..... 08 - 4
Roots of Polynomials ..... 08 - 6
Fractions and Decimals ..... 08 - 7
Double-Precision Logarithms, Antilogs, Powers & Roots ..... 09 - 6
Probability Functions to 10 Places ..... 10 - 4
Numerical Integration Routines ..... 10 - 4

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